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STUDIES ON THE DARKLING BEETLES (COLEOPTERA: TENEBRIONIDAE) KNOWN FROM GRAND BAHAMA ISLAND, WITH DESCRIPTIONS OF NEW SPECIES OF *BRANCHUS* AND *ADELINA*

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Abstract.—An annotated checklist of the darkling and comb-clawed beetles (Coleoptera: Tenebrionidae) of Grand Bahama Island is given, with observations on habitats, biology, and biogeography. More than 55% are new records for the Bahamas and some others are new island records. ***Branchus saxatilis* Steiner, new species**, and ***Adelina maryjoae* Steiner, new species**, are described and illustrated. *Nautes viridimicans* (Horn 1878), described from Tampa, Florida, is placed as a **new synonym** under *Nautes azurescens* (Jacquelin du Val 1857), described from Cuba. Threats to some species via degradation of the native maritime scrub habitats are discussed. Of the 31 species now known from Grand Bahama, 25 also occur in Florida, and a subset of 18 of the Florida species also are known from Cuba. Five of the species are known or suspected to be adventive.

Key Words: Bahamas, *Casuarina*, endemic insects, introduced species, island biogeography, new synonymy, threatened habitats

Systematic studies on the darkling beetles (Coleoptera: Tenebrionidae) of the West Indies are proving to be of great value toward increased understanding of the patterns of island biogeography of the Caribbean region. My interest in this group of insects and the distributions of adventive and endemic species on islands, after two visits to Grand Bahama Island, led to this study. Similar treatments of island faunas are planned for future research in the Bahamian region, in order to document the endemicity and adventive elements in these islands, and assist in enrichment of the Bahamian National Insect Collection and of other institutions.

While identifying the available specimens and reviewing the literature, it became apparent that very little is known of the Bahamian beetle fauna. Biodiversity surveys have been done on only a few islands, and systematic studies have focused primarily on Lepidoptera and Hymenoptera (Elliott 2003). Only 28 species of Tenebrionidae are documented as occurring in the Bahamas (Steiner in press) but in the short time spent collecting these beetles on Grand Bahama, 30 species were documented; most represent new distribution records for the Bahama Islands, and two are newly described in this paper. Observations on the biology (including excerpts from field notes) and known distribution of each species are given for the new material, and other records in the literature are noted.

West End, Grand Bahama Island lies about 100 km east of the Florida Peninsula at latitude 26°N; the elongate island extends eastward approximately 140 km and has a total land area of 1,356 km^2. It is surround-

ed by other Bahamian islands and small cays to the north, east and south at varying distances and these islands have a great range in size. The nearest other island of comparable size is Abaco, arcing around and east of Grand Bahama's eastern end and separated from it at one point by only about 20 km. Abaco, Grand Bahama, and their associated offshore cays are all part of the Little Bahama Bank (Shattuck and Miller 1905), which was a single large island during lower sea levels of the Pleistocene (Sealey 1994). For these reasons, Grand Bahama and Abaco would be expected to have similar insect faunas (Browne et al. 1993). While closer to its neighboring lands during that period, there was no land bridge between the Florida peninsula nor the Great Bahama Bank ("Paleoprovidence"). Of the two primary types of islands (Gillespie and Roderick 2002), Grand Bahama can be considered a "Darwinian" island in that sense as well as a "fragment" island in the other, because it has separated from a larger land mass since the Pleistocene.

The natural vegetation of the island interior is forested, with the dominant tree being Caribbean pine (*Pinus caribaea* Morelet) on a rugged karst terrain which is nowhere elevated more than a few meters above sea level (highest point less than 21 m). Thickets of *Sabal palmetto* (Walt.) Lodd. ex JA & JH Schultes form much of the understory, mixed with various shrubs; large hardwood species are uncommon, but this may be the result of the historical harvest of wood. The northern coast of Grand Bahama is irregular, with mangrove inlets and cays. The southern coast has beach and dune formations of varying width, slope, and sand composition. The calcareous sand deposits of the western Bahamas provide a mosaic of differing substrate deposits and textures due to storm action and sea level fluctuation (Multer 1977, Sealey 1994) and this provides a dynamic mixture of microsites for colonization by geophilous beetles. With the combination of coastal soils and interior forest, the island offers habitats (Correll 1979) for several guilds of geophilous, lignophilous and fungivorous Tenebrionidae. However, native maritime scrub of the southern strand has in most areas been severely altered with the invasion of *Casuarina equisetifolia* L. and related species (Hammerton 2001) with resulting impacts on beetle ocurrences in such habitats noted (Steiner 1991, in press).

Table 1. Gazetteer of label localities for Tenebrionidae of Grand Bahama Island.

Label Locality	Lat./Long.
Bootle Bay Village	26°39′N, 78°56′W
Eight Mile Rock	26°31′N, 78°47′W
Freeport	26°30′N, 78°41′W
Garden of the Groves	26°32′N, 78°30′W
Holmes Rock Village (5 km NW)	26°36′N, 78°52′W
Lucaya (beach)	26°29′N, 78°37′W
Lucaya (19 km ENE of)	26°34′N, 78°26′W
McLean's Town	26°39′N, 77°59′W
West End	26°42′N, 79°00′W
Xanadu Beach	26°29′N, 78°42′W

Methods

Many of the specimens reported here were taken in June 1987 (8 days of collecting effort) on the south side of Freeport, at fluorescent lights around a building that was located next to forested land, and by operation of black lights on several evenings near this site. One Malaise trap and several yellow pan traps at forest edges were also used at this locality. Various microhabitats were investigated with hand-collecting techniques, at this and other localities as noted under each species record below. Specimen label localities and their coordinates are listed in Table 1. All labels from the June 1987 collection read "GRAND BAHAMA ISLAND" (first line), followed by the locality and date (given under each species listing, below) and ending with (collectors) "W. E. Steiner, M. J. & R. Molineaux." October 1995 (3 days of collecting effort) specimens are labeled similarly but have coordinates of the locality given, and end with "coll. W. E. Steiner

& J. M. Swearingen." Label data on type material, and the few other specimens from other sources, are spelled out in full. Specimens are deposited in the collections of the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM), the Bahamian National Insect Collection, Nassau (BNIC), and other institutions as noted in the specimen records.

A search for additional material in museum collections leading up to this study was made, but was largely unsuccessful (as discussed below). Literature records were also searched.

Results

The checklist (Table 2) of known Tenebrionidae from Grand Bahama Island includes 31 species representing 7 subfamilies and 15 tribes as presently recognized (Aalbu et al. 2002). Annotations given below for each of the species follow this sequence. The majority of species are considered to be indigenous to the island and the region, but three are identified as being introduced from outside the region and two are probably recent arrivals from adjacent land areas; six are evidently endemic to the Bahama Islands. Most are new island records and the first reported for the Bahamas; in many cases they represent a range extension from some adjacent area, principally Florida. Few Grand Bahama specimens and literature records were found, probably because of the historical lack of focus on this group in the archipelago (Steiner, in press), and the relatively little general work by entomologists on this island. A relatively low number of Cerambycidae are recorded (Browne et al. 1993) from Grand Bahama, larger than some islands with greater richness documented, illustrating the lack of comparable collecting there. Perhaps the largest known Grand Bahama insect collection is that of D. J. MacDonald, kept at the Rand Nature Centre, Freeport (Elliott 2003), but a family-level inventory did not list any Tenebrionidae (N. B. Elliott, personal communication). In addition, the BNIC, Nassau, currently holds mostly Lepidoptera, Hymenoptera, Orthoptera, and aquatic insects.

Epitragodes tomentosus (LeConte)

"5 km. NW Holmes Rock Village, 24 June 1987" (1).

This unique female was found by Jennifer Molineaux "at top of dune, under a white shell" and other field notes describe the beach as "fairly narrow and sloped, with a steplike slip-face at dune edge; an elevated rolling dune area fairly broad, and stabilized with trailing grasses, *Ipomoea*, and succulents. Behind this and down in slack area was an abrupt dense scrub of old *Coccoloba*; no Australian pine here yet." Except for a recent listing for "Bahamas" (Peck and Thomas 1998) this beetle was not previously known outside of the continental USA (Freude 1968). This was an unexpected occurrence, but the species is winged and does occur along similar beaches, barrier islands and sandy areas along the southern Atlantic coast; larvae live in sandy soils (Hoffman et al. 2003; Steiner 1988, 1995, unpublished data). Compared with individuals from Florida, the specimen is larger than average and more robust with larger, denser punctures and setae of the dorsal surface. Two subspecies are recognized and separated on such differences (Freude 1968) and it is possible that the Bahamian form represents a third, but more material will be needed to determine its distinctness. M. A. Ivie (personal communication) has seen a specimen from the Bimini Islands labeled "South Bimini Isl., Bahamas, B.W.I., March 22–25 1958, A. M. Nadler," determined by C. A. Triplehorn and in the collection of American Museum of Natural History. This probably is the source of the Bahamian record listed by Peck and Thomas (1998).

***Branchus saxatilis* Steiner, new species**
(Figs. 1–3A–D)

The occurrence of a *Branchus* on Grand Bahama was expected since members of the

Table 2. Checklist of Tenebrionidae known from Grand Bahama Island. Classification follows that of Aalbu et al. (2002). Abbreviations: A, adventive; B, new island record but previously known from the Bahamas; N, new record for the Bahamas; E, apparently endemic to the Bahamas; P, previously reported from the island; FL and CU, also known from Florida and/or Cuba. Refer to the text on each species for more distributional data, specific information and discussion.

Pimeliinae
Epitragini
1. *Epitragodes tomentosus* (LeConte)—N; FL
Branchini
2. *Branchus saxatilis* Steiner, n. sp.—N, E
Diaperinae
Phaleriini
3. *Phaleria picipes* Say—B; FL+CU
4. *Phaleria punctipes* LeConte—P; FL+CU
5. *Phaleria testacea* Say—B; FL+CU
Diaperini
6. *Adelina plana* (Fabricius)—N; FL+CU
7. *Adelina bidens* (Schaeffer)—B; FL+CU
8. *Adelina maryjoae* Steiner, n. sp.—N, E(?)
9. *Diaperis maculata* Olivier—B; FL+CU
10. *Platydema excavatum* (Say)—N; FL+CU
11. *Platydema nigratum* (Motschulsky)—N; FL+CU
12. *Platydema ruficorne* (Sturn)—N; FL
13. *Platydema ruficorne* (Sturn)—N; FL
14. *Neomida bicornis* (Fabricius)—B; FL+CU
Crypticini
15. *Gondwanocrypticus platensis* (Fairmaire)—A, N; FL
Hypophloeinae
16. *Corticeus thoracicus* (Melsheimer)—N; FL
Opatrinae
Opatrini
17. *Blapstinus fortis* LeConte—N; FL+CU
18. *Diastolinus bahamae* Marcuzzi—P, E(?)
Platynotini
19. *Alaetrinus pullus* (Sahlberg)—N, A(?); FL+CU
Leichenini
20. *Leichenum canaliculatum variegatum* (Klug)—A, N; FL+CU
Tenebrioninae
Helopini
21. *Nautes azurescens* Jacquelin du Val—N; FL+CU
Triboliini
22. *Tharsus seditiosus* LeConte—N; FL
Alphitobiini
23. *Alphitobius diaperinus* Panzer—A, N; FL+CU
Amarygmini
24. *Cymatohes tristis* (Laporte)—N, FL+CU
Alleculinae
Alleculini
25. *Lobopoda nesiotica* Campbell—P, E
26. *Hymenorus densus* LeConte—P; FL
27. *Hymenorus bahamensis* Campbell—P, E
28. *Hymenorus farri* Campbell—N, A; FL+CU
29. *Hymenorus convexus* Casey—P; FL+CU
30. *Hymenorus transversus* Campbell—B, E
Coelometopinae
31. *Glyptotus cribratus* LeConte—P(?); FL

genus occur in southern Florida (Triplehorn and Weems 1964) and on New Providence (LeConte 1866) and Cuba (Spilman 1961) and specimens from other Bahamian islands had been seen by me. After extensive search in the most likely habitats (Steiner 1991), a single female specimen was found at Eight Mile Rock, with associated larvae, on the first visit in June 1987. The beetle was distinct from any of the neighboring forms, but more specimens were needed to warrant a description. This prompted the return to the site in October 1995, and it proved successful.

Description.—Holotype, male (Figs. 1–3): Body color very dark brown, outline oval, nearly continous except for small indentation between posterior angle of pronotum and elytral humerus; form convex, about equally so dorsally and ventrally; body length 12 mm from anterior angle of pronotum to elytral apex, greatest width 7.2 mm at basal ⅓ of elytra; dorsum dull, covered with fine, decumbent, pointed and tapered, golden brown setae.

Head less than ½ as wide as pronotum, widest at eyes and equally so at epistomal canthi; frons with a triangular concavity across middle. Antenna with segment 3 slightly shorter than combined length of segments 4 and 5; segments 9, 10 and 11

Fig. 1. *Branchus saxatilis*, holotype ♂, dorsal habitus. Length, 12 mm.

wider than long, forming a weak club. Mentum somewhat heart-shaped, without sharp angles; surface flat, punctate, setose. Gena slightly produced anteriorly, not extending to half the length of mentum.

Prothorax about twice as wide as long, broadest at basal ⅓, sides evenly arcuate, anterior margin broadly and evenly emarginate, anterior and posterior angles produced, the latter with rounded, flattened apices directed posteriorly; lateral margin very slightly explanate, without a polished bead; pronotum evenly convex, surface with shallow rounded punctures, some contiguous, each bearing a flattened scalelike seta extending just beyond posterior margin of puncture; punctures absent along a narrow smooth midline and on very small, slightly raised areas on middle of each side of disk; ventral surfaces more sparsely punctate with setae slender, hairlike, and not as flattened or decumbent.

Elytron widest near basal $\frac{3}{5}^{ths}$, about 2.5 times longer than wide; dorsal surface generally smooth except for basal plicae (Fig. 1) and poorly defined rows of large deep punctures, mostly confined to basal ⅔; scalelike setae smaller and more decurved than those on pronotum, arising from very inconspicuous punctures, distributed evenly or in slightly more dense patches but with gaps around the large punctures (Fig. 2). Margin of pseudepipleuron moderately well defined but not sharp or beaded; scalelike setae more dense than on elytral disk. Epipleuron long and tapered to elytral apex, generally $\frac{1}{4}^{th}$ as wide as pseudepipleuron but abruptly widened at base.

Sternites somewhat polished, with setiferous punctures on most areas but smaller, not as dense, especially sparse in median areas of abdominal sternites 1–4 which are smoother, shining. Legs with scalelike setae especially on tibiae; more hairlike on femora and relatively dense on flat ventral surfaces of meso- and metatibiae; tibial spurs well developed. Protibia broad and truncate at apex, forming a tooth at outer angle; meso- and metatibiae expanded at apex; metatibia arcuate. Tarsi with conspicuous golden setae on ventral surfaces, especially on pro- and mesotarsomeres 1–4.

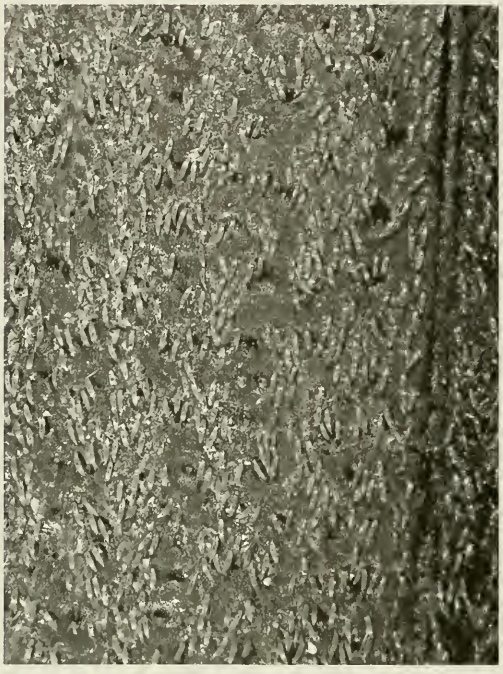

Fig. 2. *Branchus saxatilis*, holotype ♂, detail of elytral surface including suture. Length of setae, ca. 0.11 mm.

Tegmen (Fig. 3A–D) with apical piece slightly longer than basal piece, flattened and truncate at apex, sinuate across apex with slight asymmetry between small, sharp, lateral projections. Median lobe with a slender arching rodlike apex, ending with a slightly bulbous tip.

Female: Similar to male but larger, 13–14 mm long and more robust, inflated. Secondary sexual differences include lack of the arcuate form of the hind tibia, much reduced setose flat ventral surfaces on the meso- and metatibiae, and more convex abdominal sterna.

Variation.—The largest of the 5 males is 12.3 mm long, the smallest is 11.5 mm long. Some specimens have a soil encrustation that obscures some of the punctures and setae.

Type data.—Holotype ♂, 4 ♂ paratypes and 1 ♀ paratype: "GRAND BAHAMA

Fig. 3. *Branchus saxatilis,* holotype ♂, genitalia. A, Tegmen, dorsal view. B, Tegmen and median lobe, lateral view. C, Apical piece, dorsal view. D, Apical half of tegmen and median lobe, ventrolateral view. Length of tegmen, 5.3 mm.

ISLAND, Eight Mile Rock, 26°31′N, 78°47′W, 25 October1995, coll. W. E. Steiner & J. M. Swearingen;" 1 ♀ paratype, same data except "26 June 1987; W. E. Steiner, M. J. & R. Molineaux" and 1 ♂ paratype, "Abaco Cays, Allans Cay, May 9, 1953/Van Voast-A.M.N.H. Bahama Isls. Exped., Coll. E. B. Hayden." The holotype and 4 paratypes are deposited in USNM; two paratypes, in BNIC, and the Abaco paratype, in the American Museum of Natural History, New York.

Etymology.—The specific name comes from the Greek word "*saxatilis*" meaning "of the rock," in reference to the name of the type locality, Eight Mile Rock. The coastal strand of beach at the locality is characterized by a ledge of coral rock on which the habitat of these beetles exists.

Diagnosis and relationships.—*Branchus saxatilis* belongs to the "*floridanus* group" (Steiner 1991) that includes the type species, *B. floridanus* LeConte (1866), illustrated by Triplehorn and Weems (1964) from southern Florida, and *B. woodi* LeConte (1866) from New Providence, and several other species to be described. All of the members of this group have the same distinctive form of the male genitalia, with minor variations; the external characters are more useful for recognizing the species, in particular the details of the scale-like elytral setae. These are very short, sparse and inconspicuous in *B. floridanus,* narrow, fine and evenly scattered in *B. woodi*; the latter are generally smaller beetles, and neither species has the large, deep, elytral punctures seen in *B. saxatilis. Branchus saxatilis* appears to be endemic to islands of the Little Bahama Bank, but is most closely related to its neighboring congeners in Florida and islands of the Great Bahama Bank. A

key to *Branchus* species will be provided in a future monograph of the group.

Biology.—At the type locality, digging by hand in coarse sand among low shrubs led to the discovery of several large larvae, later confirmed as belonging to *Branchus*. This preceded the finding of the first adult beetle, as described by me in field notes on 26 June 1987: "Found a small pull-off at beach front on a rocky ledge—no beach at the surf line here, but rugged coral rock + pounding waves; dune sand was on upper part of coral bedrock, however, + had a low shrub zone, with no *Casuarina*. The large black *Blapstinus* [= *Diastolinus bahamae*] common here at edge of shrub patches under drift boards + leaf litter; associated larvae in sand a few cm deep. Dug deeper in loose sand under a piece of scrap lumber + found a big larva—looked like *Branchus* but larger than any *B.* larvae from Florida—kept digging around this local area at edge + under low spreading shrubs, finding more larvae in different sizes but most as large as the 1st; after about half an hour, excavated a single ♀ adult *Branchus*, about 4–5 cm in sand, under a single layer of dead leaves in shade of low shrub, in among sticks + roots. Sand cool + dry, loose, + mixed with dark organic particles." On the return visit to this site eight years later, October 1995, adult beetles were more easily found, not as deep in sand but under leaf litter that was wet from recent rains; only one half-grown larva was found at this time. Known larvae of several *Branchus* species are to be described in a future work.

This site was unique in being free of shade from *Casuarina* trees, presumably because the shallow sand on the rock ledge has prevented their establishment, but adjacent to this section of coast was a dense stand of old *Casuarina*, typical of most of the shoreline on the southern strand. Searches for *Branchus* specimens at all other sites visited were not successful; the dune crest and scrub vegetation behind the beach front in all other sites was shaded out by these trees, or had been altered or lost by construction of buildings and roads. The threats to native biota by the dominance of the introduced *Casuarina* spp. are severe (Hammerton 2001) and *Branchus* species may be the most threatened of maritime scrub insects because of their habitat restrictions (Steiner 1991, in press). Because *Branchus* beetles were searched for at all coastal sites visited, but found on Grand Bahama only at the type locality, *B. saxatilis* may be of conservation concern. Its status on Abaco is unknown at present.

Phaleria picipes Say

"Bootle Bay Village, 24 June 1987" (7).

These specimens were among the larger series of *P. testacea* listed below; the two species often co-occur. My field notes describe "a well developed step-like beach of more coarse coral sand" and beetles taken "in moist sand under seaweed drift mats recently washed in." Species of *Phaleria* are restricted to coastal beach sands where they feed on drift debris; this species and its two congeners listed below are widespread in the Caribbean region and highly variable in size and coloration (Triplehorn 1991, Triplehorn and Watrous 1979, Watrous and Triplehorn 1982). The above specimens range from a uniform dark brown to a yellowish tan color; elytra are sometimes more pale than the pronotum and head. *Phaleria picipes* is known from the other Bahamian islands of South Bimini and Rum Cay (Triplehorn and Watrous 1979).

Phaleria punctipes LeConte

"5 km. NW Holmes Rock Village, 24 June 1987" (3); "Lucaya (beach), 25 June 1987" (4); "19 km. ENE Lucaya, 25 October 1995" (1); "McLean's Town, 26 October 1995" (1); "Xanadu Beach, 21 June 1987" (24), "23 June 1987" (3).

For a flightless species, *P. punctipes* is surprisingly widespread on many islands (see papers cited under *P. picipes*) includ-

ing small ones, e.g., Pigeon Cay near Andros (Anderson 1996). Beetles and larvae are found under washed-up sea drift that is generally more dry and higher on the beach than that used by *P. testacea* and others, e.g., as noted for the Xanadu Beach series: "under dry drift piles on a higher plateau of sand above normal high tide, and we found a concentration of them–in dry loose sand but where sand was moist 3–4 cm below surface. Some were even up at edge of beach grass and stabilized zone, and were found next to the *Blapstinus*."

Phaleria testacea Say

"Bootle Bay Village, 24 June 1987" (48); "Lucaya (beach), 25 June 1987" (13).

These were at first misidentified as *P. picipes* (in field notes) because the mixed coloration of Bahamian specimens is more typical of that species. Grand Bahama specimens range from yellowish brown to medium brown and about 10 % are bicolored (elytra mostly brown with a lateral stripe and basal band of yellow). The series from Lucaya was found with *P. punctipes* "on and in sand under seaweed drift mats along recent high tide line, upper part of wide, coral-sand beach."

Adelina plana (Fabricius)

"Eight Mile Rock, 26 June 1987 / Under bark of dead *Casuarina*" (11); "Freeport, 24 June 1987" (1), "26 June 1987" (1), "27 October 1987" (14); "19 km. ENE Lucaya, 25 October 1995" (2).

This beetle is widespread in the Neotropical region and reported from Cuba (Ardoin 1977) and Florida (Peck and Thomas 1998). They are attracted to lights and I have found them associated with larvae under dry thin bark of dead standing or recently fallen wood, not rotten, in semi-shaded sites. Notes on the specimens of 27 October read "series of small *Adelina* + 2 assoc. larvae under tight bark of cut logs, probably *Acacia* or related legume."

Adelina bidens (Schaeffer)

"19 km. ENE Lucaya, 25 October 1995" (3).

Specimens were found co-occurring with the two *A. plana* cited above "under bark of fallen *Casuarina*" in a coastal forest dominated by that tree; "Casuarinas dominant but many dead, standing." The species is not as widespread as *A. plana* but was reported from South Bimini (Vaurie 1952) and is also recorded from Cuba and Florida (Ardoin 1977, Peck and Thomas 1998); Ardoin (1977) also listed the Dominican Republic and Guatemala.

***Adelina maryjoae* Steiner, new species**
(Figs. 4A–G)

This distinctive species is known only from the holotype. It is different from all other species in the genus in having a conspicuous, long basal antennomere or scapus (Figs. 4A–C). Ardoin (1977) recognized 18 species from the Americas and two others have been described since then (Triplehorn and Ivie 1983, Doyen 1984).

Description.—Holotype, male (Figs. 4A–F): Length (from clypeal margin to elytral apex) 6 mm.; width (across middle of elytra) 2.4 mm.; greatest thickness (at metasternite) 0.7 mm. Body form very flat, elongate, parallel sided; surfaces smooth, shining; color reddish brown. Head finely punctate, nearly twice as wide as long, widest at laterally expanded epistomal canthus; anterior margin with an undulate appearance; area of frons between eyes slightly concave, then anteriorly with an abrupt declivity, with three shallow concavities, one median and others lateral to it. Labrum very small, setose; membrane at base not visible. Antenna long, reaching beyond basal ¼th of elytron if folded back along body; scapus enlarged, clavate, nearly as long as head, setose on anterior side; pedicellus small, rounded; antennomeres 3 and 4 clavate, about twice as long as wide, with setae around widest area near apex; antennomeres 5–10 of similar form, about 3 times as

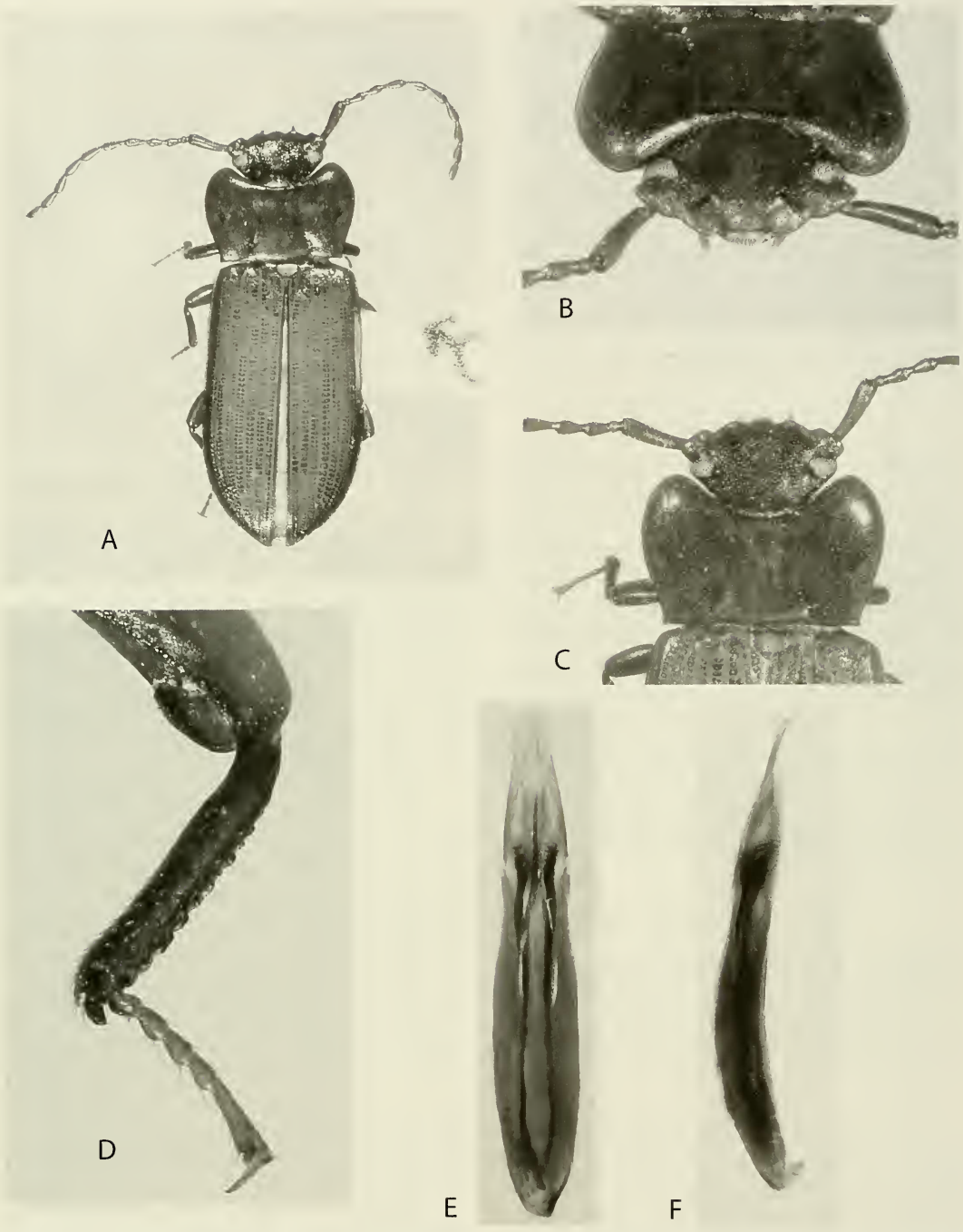

Fig. 4. *Adelina maryjoae*, holotype ♂. A, Dorsal habitus. B, View of frons. C, Dorsal view of pronotum and head. D, Front leg, right, posterior view. E, Tegmen, dorsal view. F, Tegmen, lateral view. Length of beetle, 6 mm; tegmen, 1.4 mm.

long as wide, antennomere 11 shorter than preceding, narrowed to a pointed apex. Prothorax broad, disk flattened, finely punctate laterally, less so medially; basolateral foveae conspicuous; anterior margin widely, evenly and deeply emarginate; basal margin nearly straight; lateral margin sinuate, finely beaded, widening rapidly from acute posterior corner to broadly rounded, inflated anterior corner. Scutellum flat, impunctate, with shape of a rounded-off triangle. Elytron about 3 times as long as wide; strial punctures small, regularly spaced, separated by about the diameter of a puncture; intervals with very fine scattered punctures; edge of lateral declivity of elytron beginning at the seventh stria, sharp basally, more rounded toward apex. Legs smooth, setae inconspicuous; front tibia straight, mostly parallel sided to apex, with a crenulate outer margin (Fig. 4D); front tibial spurs short, thick, larger curved; tarsomeres unmodified; basal first tarsomere only slightly thickened, without a ventral process. Tegmen (Fig. 4E) with basal piece more than twice as long as apical; base with asymmetric apex; apical piece narrowed and flattened from base to broadly rounded apex which is deflexed in lateral view (Fig. 4F).

Type data.—Holotype ♂, "GRAND BAHAMA ISLAND, Freeport, 23 June 1987; W. E. Steiner, M. J. & R. Molineaux/At light on building; Caribbean pine and palmetto scrub." The holotype is deposited in USNM.

Etymology.—The specific name "*maryjoae*" is derived from the names Mary + Jo + the Latin genitive possessive feminine ending "-ae." I take pleasure in naming this species for Mary Jo Molineaux, entomological specialist with the Smithsonian Institution; her invitation to accompany her family on the 1987 trip to Grand Bahama led to the discovery of this species and most of the records reported in this study.

Diagnosis and relationships.— *Adelina maryjoae* belongs to the "premier groupe" of species recognized by Ardoin (1977) because of the position of the elytral declivity, but the large size and darker color of this beetle is more characteristic of members of the "second groupe." The lack of the ventral tooth on the first basal tarsomere is also atypical for the genus, as is the form of the front tibia, which is usually widening gradually in width from base to apex, and bearing a row of more distinct teeth along the outer margin. The relative lengths of the antennomeres offer a unique suite of characters; the enlarged basal segment is very unusual in Coleoptera, and the equal size and shape of segments 3 and 4 is unusual in *Adelina* species, in which segment 3 is generally longer and more slender than segment 4. Because the species has a number of unique apomorphies, its sister relationships may be difficult to place, but identification is easy. The female (unknown at present), however, may be found to have these characters less developed, as in other species of the genus.

Diaperis maculata Olivier

"McLean's Town, 26 October 1995/Under bark of rotting trunk of *Pinus caribaea* with polypore fungi" (1).

Previously recorded from Nassau (Triplehorn 1965), this species is widespread from North America to Panama and reported from a number of the larger Caribbean islands. This specimen was found in "pine flatwoods" on a fallen tree "at a roadside clearing edge–one trunk elevated from ground by root mass (wind thrown) and trunk fractured at one point–bark mostly tight except at this spot, where a soft fungal white mass of polypore was starting to emerge from under split bark–peeled bark back here and got a single teneral *Diaperis maculata*."

Platydema excavatum (Say)

"Freeport, 23 June 1987/At black light in Caribbean pine and palmetto scrub" (1); "On pine pulpwood, Grand Bahama Island/X-5–59, J. M. Henderson, Colr./

Jacksonville, Florida—161, lot 59–23482" (1).

One of the most widespread species of the genus, it occurs from southern Canada to northern South America (Triplehorn 1965); the small cosmopolitan bracket fungus *Schizophyllum commune* (L.) Fr. is the principal host (Leschen 1990).

Platydema nigratum (Motschulsky)

"Freeport, 22 June 1987" (3), "27 October 1995 / Under bark of rotting trunk of *Pinus caribaea* with polypore fungi" (1).

This species is known from the southern U.S.A. (and is relatively common in Florida) to Costa Rica; the only Antillean records are from Cuba (Triplehorn 1965). The specimens taken in June 1987 were "on woody polypore brackets under and on sides of logs." The large cut logs were dumped along a roadside in the native pine forest and appeared to be from some ornamental, exotic species, possibly a *Ficus*. The unidentified fungus also was the host of *Neomida bicornis* (see below). The October 1995 specimen was under the same piece of bark on a charred pine stump with the specimen of *P. ruficorne*, reported below.

Platydema micans Zimmerman

"Freeport, 21 June 1987" (3), "22 June" (1), "24 June" (1), "26 June" (1).

This is another Middle American species with distribution records that include the Greater Antilles and southeastern United States (Triplehorn 1965). It is known to inhabit leaf litter on the ground, unlike other *Platydema* species (Leschen 1990, Steiner 1995). Notes from 21 June read "Under leaf litter on sandy loose soil under roadside shrubs, took a series of *Gondwanocrypticus*, + a few *Platydema micans* + *Hymenorus* sp." This describes the typical microhabitat of this beetle. The other single specimens were taken at black light at forest edge sites.

Platydema ruficorne (Sturm)

"Freeport, 26 October 1995/Under bark of rotting trunk of *Pinus caribaea* with polypore fungi" (1).

This is the most common *Platydema* in eastern North America including the Florida Keys (Triplehorn 1965) but it has not been previously reported outside of this area. It has been associated with a number of polypore fungi (Leschen 1990). The single male was associated with the similar *P. nigratum*, reported above.

Neomida bicornis (Fabricius)

"Freeport, 22 June 1987" (9), "27 October 1995" (8).

Among the most abundant tenebrionids in eastern North America, *N. bicornis* shows considerable regional color variation over its range, from Canada to the Antilles (Cuba, Jamaica), Bermuda, and the Bahamas (Andros), with larger and more brightly metallic specimens in the southern parts (Triplehorn 1965). Various polypore fungi are recorded as hosts (Leschen 1990). The June 1987 specimens were found in association with *Platydema nigratum* as described above; the series from October 1995 was found "in whitish leathery polypores" on fallen rotting trunks of *Pinus caribaea* in forest interior. All of the specimens are of the West Indian color form (Triplehorn 1965), with a bright red pronotum and metallic blue elytra.

Gondwanocrypticus platensis (Fairmaire)

"Freeport, 20 June 1987" (1), "21 June" (13), "24 June" (1), "25 June" (1) "26 June" (1) "27 June" (1); "Garden of the Groves, 8 km. E Lucaya, 23 June 1987" (9); "West End, 24 June 1987" (2).

This species has been recently separated from the North American *G. obsoletus* (Say) and recognized as a South American species adventive to many areas including the southeastern United States (Steiner 1996, unpublished data). It is often com-

mon in open disturbed roadside areas with sandy soils, sparse turf, and leaf litter. The series taken 21 June 1987 is the *Gondwanocrypticus* mentioned in notes for *Platydema micans* above; other singletons from Freeport were taken at lights except that on 27 June, found running on a sunlit paved road after rain. The series from 23 June is noted "found some *Blapstinus fortis* + more *Gondwanocrypticus* under leaf litter, on sandy soil at edges of turf + gardens" and the specimens from West End were also associated with the same *Blapstinus* "under coconut husks, conch shells + plant debris–open weedy roadside." More information on the distribution and habits of this species will be given in a study of North American Crypticini now in preparation.

Corticeus thoracicus (Melsheimer)

"Freeport, 26 June 1987" (1).

No notes on the collection of this specimen were made, but it probably was among the numerous small beetles taken at black light along a roadside gap in pine forest. This is the first record of this widespread species outside continental North America but it is reported from Key West, Florida, and in association with *Pinus elliottii* (Triplehorn 1990), a pine very similar to *P. caribaea.*

Blapstinus fortis LeConte

"Freeport, 24 June 1987" (2), "26 June" (1); "Garden of the Groves, 8 km. E Lucaya, 23 June 1987" (5); "West End, 24 June 1987" (4).

This is a common species occurring from Florida to Texas and Central America, also Cuba and "Bahamas" (Peck and Thomas 1998). The only reported specific island record that I am aware of is for New Providence (Marcuzzi 1962). Its occurrence would not be unexpected on any of the larger islands. It can be abundant in open disturbed areas with sandy soils (see notes given for *Gondwanocrypticus* above) and the distribution appears to be expanding from its natural range via human activities. The specimens from Freeport were taken at black light; *Blapstinus fortis* has fully developed flight wings.

Diastolinus bahamae Marcuzzi

"Eight Mile Rock, 26 June 1987" (25), "25 October 1995" (14); "5 km. NW Holmes Rock Village, 24 June 1987" (7); "19 km. ENE Lucaya, 25 October 1995" (1); "Pelican Point, 26 October 1995" (5); "Xanadu Beach, 21 June 1987" (12), "27 October 1995" (2).

This species was described from Gold Rock Creek, Grand Bahama (Marcuzzi 1965) and in the same study, two other closely related forms were named from other Bahamian islands. They belong to a group of species for which taxonomic revision is badly needed. Some specialists would include these in the large genus *Blapstinus,* while others consider the flightless species (including this and others with fused elytra) as distinct, but there is considerable variation in the development of flight wings among other species currently placed in *Diastolinus* and *Blapstinus.* The Florida species *Blapstinus alutaceus* Casey and *B. dispar* Casey belong to the same close species group with Bahamian *Diastolinus* species. A reassessment of placement of all circum-Caribbean forms is obviously necessary, but will require comparative studies of many taxa in the "*Blapstinus* complex." At this time I have chosen to retain the specific nomenclature. In the 1987 field notes, however, I used *Blapstinus* for this taxon; it is the species mentioned in association with *Phaleria punctipes,* above, and figured (Steiner in press, fig. 8) as an example of a group in need of study. On Grand Bahama, the beetles are all from coastal sites, none from inland habitats. They were found most commonly at the upper edge of sand beaches, on the sand surface but under leaf litter or drift debris, around the first spreading plants or shrubs of the dry but vegetated

zone and often at the edges of bare sand gaps among plants.

Alaetrinus pullus (Sahlberg)

"Freeport, 23 June 1987" (1), "24 June" (1), both with second label "Yellow pan trap in Caribbean pine and palmetto scrub."

Alaetrinus Iwan (1995), a subgenus of *Opatrinus,* was recently elevated to genus level (Iwan 2002). The two specimens above were studied and identified in the course of the review (Iwan 1995) of the genus *Opatrinus* but were omitted in the list of specimens examined and the distribution map. No other Bahamian specimens are known; the distribution (Iwan 1995) includes Bermuda, the Florida Keys and Antillean islands from Cuba to St. Croix, and also the Yucatan region. Other extralimital occurrences were discussed as probable introductions and he believes that the species range is expanding due to anthropogenic activity. This may be the case on Grand Bahama, since the two specimens were taken in the same pan trap "at edge of open scrub and trash at side of parking lot."

Leichenum canaliculatum variegatum (Klug)

"Freeport, 26 June 1987" (1).

This is an adventive species, presumably from Madagascar and established in the southeastern United States (Spilman 1959) as well as Cuba and Guadeloupe (Marcuzzi 1984); it occurs on sandy soils and is now widespread in Florida (Peck and Thomas 1998). The single specimen was found at black light at forest edge and "probably crawled up on to edge of ground sheet from dry sandy roadside bank." Spilman (1959) mentioned "many occurrences at light" based on label data; beetles are fully winged. I have found the beetles (at other localities, including Madagascar) under leaf litter in open sandy coastal sites and reared a pupa (Steiner 1995) from larvae associated with adults from pure dune sand.

Nautes azurescens (Jacquelin du Val)

Helops viridimicans Horn 1878: 57. **new synonymy.**

"Freeport, 20 June 1987" (11), "21 June" (3), "22 June" (7), "23 June" (9), "24 June" (12), "25 June" (8), "26 June" (5).

All of the specimens were taken at lights with the exception of one dated 25 June, noted as being found dead in a swimming pool. Helopines are generally forest-dwelling beetles with immature stages in the soil (Steiner 1995, 1999) but the habits of this species are unknown. In making this identification, I have compared these specimens with identified material from Cuba and also with Florida specimens identified as *Nautes viridimicans* (Horn). They appear to be conspecific. The form of the aedeagus does not differ significantly among males from the three lands. Cuban specimens are generally larger and metallic greenish, Florida specimens are more blue-green in color but less brightly metallic, and the Bahamian ones are intermediate in color and much less brightly shining. Bahamian specimens average smaller in size, but considerable variation and overlap in size is seen among all forms. I have not examined type specimens, but with confidence can place *Helops viridimicans* (Horn 1878), described from Tampa, Florida, in synonymy under *Nautes azurescens* (Jacquelin du Val 1857), described from Cuba (new synonymy). Both were described in the genus *Helops* and perhaps should have remained there; the genera of Helopini are in need of redefinition. Numerous related species, some flightless, occur on islands throughout the Caribbean region and most are undescribed (Steiner 2005).

Tharsus seditiosus LeConte

"Freeport, 21 June 1987" (2), "25 June / At black light in Caribbean pine and palmetto scrub" (1), "26 June" (1), "27 October 1995 / Under bark of rotting trunk

of *Pinus caribaea* with polypore fungi" (5).

Previously known only from the southeastern United States including southern Florida (Peck and Thomas 1998), this is the first record of the beetle outside of that region. It is the first record of the genus for the West Indies. The beetle is not common in collections; many U.S. records are from areas dominated by pine forest, as are the specimens above. One of the June 21 specimens was from a dead trunk of *Pinus caribaea,* "under bark slightly damp beneath, about 3 dm. above ground." The October 1995 notes record a "series of *Tharsus* under bark on sides of fallen logs, with 1 assoc. larva; bark moist beneath, more or less loose with a layer of frass under it."

Alphitobius diaperinus Panzer

"Freeport, 20 June 1987" (1), "21 June" (1), "24 June" (1), "26 June" (2).

All of these specimens were taken at lights, but details of the biology of this species are well studied and it has pest status as well as possible value in biological control (Despins et al. 1988). A nearly cosmopolitan beetle of African origin, it is known from the United States and a number of West Indian Islands (Marcuzzi 1984).

Cymatothes tristis (Laporte)

"Freeport, 22 June 1987" (2), 27 October 1995/Under bark of rotting trunk of *Pinus caribaea* with polypore fungi" (1); "19 km. ENE Lucaya, 25 October 1995/ Under bark of rotting trunk of *Pinus caribaea* with polypore fungi" (5).

Species in this genus were formerly placed in the genus *Pyanisia* LaPorte (Spilman 1973). This species appears to be naturally distributed among West Indian Islands that have forest habitats, as well as the southern United States to Panama (Marcuzzi 1984; Peck and Thomas 1998; Spilman 1969). The two specimens from June 1987 were found after dark on the same logs, probably *Ficus* sp., noted under *Platydema nigratum* above. For the series taken 25 October 1995, I noted "Cleared areas with cut or fallen pines, some charred. Under loose bark got several adult and larval *Cymatothes,* some associated with bright orange fungal tissue" and the 27 October specimen was found under bark with the *Tharsus* specimens noted above.

Lobopoda nesiotica Campbell

"Freeport, 20 June 1987" (4), "21 June" (1), "22 June" (2), "23 June" (1), "24 June" (5), "25 June" (5), "26 June" (6); "20–27 June 1987 / Malaise trap in Caribbean pine and palmetto scrub" (11).

Other than the Malaise-trapped series, all specimens were taken at lights. This species is among several that are apparently endemic to the Bahamas; it was described (Campbell 1971) from specimens from Andros (type locality), Grand Bahama (Freeport), and Great Abaco.

Hymenorus bahamensis Campbell

"Freeport, 20 June 1987" (1).

A variable species with a complex of island forms (Campbell 1971), this species is known only from the Bahamas and Cuba, and occurs on a number of the islands including one record from West End, Grand Bahama (Campbell 1971).

Hymenorus convexus Casey

"Freeport, 26 June 1987" (1); "Xanadu Beach, 23 June 1987" (2).

Campbell (1971) stated that this species "probably occurs on every island" of the Bahamas and also Cuba and southern Florida. He reported Grand Bahama records from Eight Mile Rock and West End. Specimens were taken at lights; the Xanadu Beach specimens came to a black light facing inland (from the beach) over open disturbed growth of low scrub.

Hymenorus densus LeConte

"Freeport, 20 June 1987" (1), "24 June" (1), "25 June" (2), "26 June" (2).

These specimens were taken at lights. Campbell (1971) reported this species as common along the U.S. coast from North Carolina to the Florida Keys, and gave a number of records from the Bahamas, including Grand Bahama (Pine Ridge). It is also listed from Mexico (Peck and Thomas 1998) but is not known from other islands of the West Indies.

Hymenorus farri Campbell

"Freeport, 20 June 1987" (4), "21 June" (3), "24 June" (1), "26 June" (1).

This would have represented a considerable range extension, since the species was described from Jamaica, Cuba and the Cayman Islands (Campbell 1971), but it is now known from southern Florida, Puerto Rico, Virgin Islands, and other Bahamian islands (Steiner 2004). Either the range was much wider than originally detected, or the species is expanding its range in recent decades. The latter scenario seems more likely, since it is often common, and recent faunistic works (Campbell 1971, Peck and Thomas 1998) did not detect it. Also, it does occur in open, disturbed habitats and is associated in the same microsites with the adventive *Gondwanocrypticus,* e.g., the specimens from 21 June, and collections from the other localities mentioned above.

Hymenorus transversus Campbell

"Freeport, 20 June 1987" (1), "21 June" (1), "24 June" (2); "20–27 June 1987 / Malaise trap in Caribbean pine and palmetto scrub" (3).

This is a new island record for this Bahamian species; Campbell (1971) described it from the nearby Bimini Islands and others in the northern part of the Bahamas. It is the smallest of the *Hymenorus* on Grand Bahama. Information on specific larval microhabitats for this and the other alleculines on the island can only be inferred from data on related members of the group (Steiner 1995).

Glyptotus cribratus LeConte

No specimens examined.

The species was listed by Leng and Mutchler (1914) from "Bahama" and I provisionally interpret this to mean Grand Bahama. Peck and Thomas (1998) gave widespread Florida records and also listed "Bahamas" based on that record. The original source of the record is unknown. It could have been collected by H. F. Wickham, but Grand Bahama was apparently not visited by him (Wickham 1895). Its occurrence on Grand Bahama would not be unexpected. In South Carolina, beetles have been taken in hollow trees and under bark (Kirk 1969) and I have observed similar habits for the species in several U.S. localities, and reared the larvae from dead branches on hardwood trees. A larva identified as that of *G. cribratus* by St. George (1924) came from Big Pine Key, Florida where adults were noted to occur "in large numbers." The species is widespread along the southeastern U.S. coastal plain from Texas to Virginia (Hoffman et al. 2003).

Biogeography

Of the 31 species (Table 2) now known from Grand Bahama, 25 also occur in Florida, including the 5 species known or suspected to be adventive. A subset of 18 of those 25 species is also reported from Cuba. Colonization from these two land masses (which were closer to each other during the Pleistocene), and possibly via other Bahamian islands, is the likely source of these faunal elements. Many of these are winged species and widespread in Middle America. Only three of the species are flightless, and two of these (*Branchus saxatilis* and *Diastolinus bahamae*) are apparently endemic to the Little Bahama Bank. The diversity of tenebrionids on Grand Bahama can be attributed to the relatively var-

ied and complex habitats on the island, in spite of its low elevation, from the sea drift and zones of maritime scrub to the pine forest interior. This offers breeding sites for the geophilous forms as well as the rotten-wood and fungus-feeding specialists, and would facilitate colonizations by natural or anthropogenic means. Proximity to the mainland and other islands is probably the reason that a low percentage of endemic species occurs there. In addition, the geologically young Bahamas, having been completely inundated during the Pliocene (Browne et al. 1993), would be more open to colonization via over-water dispersal and less likely to have provided isolation for speciation events (Peck 1989). Some of the alleculine species, all winged, are apparently endemic to the Bahamas but not necessarily restricted to single islands or banks, and one species, *Hymenorus convexus,* is thought to have colonized southern Florida from the Bahamas (Campbell 1971).

With further collection and field work, additional species of Tenebrionidae are expected to be documented for Grand Bahama in the future, especially the cosmopolitan stored-product pests and those winged species that have a wide natural distribution in the Caribbean region. A comparable survey of Abaco and surrounding cays is desirable. The other islands of the Bahamian banks await similar surveys. Inter-island faunal relationships can be better described with equivalent specialized sampling efforts on each island that build collections of such information-rich taxa. Flightless forms such as *Branchus* and *Trientoma* spp. and members of the *Blapstinus-Diastolinus* complex will be of the greatest interest and value in studies of biogeography.

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